Connecticut General Assembly

TRANSPORTATION COMMITTEE

February 20, 2013

STATEMENT IN OPPOSITION TO PROPOSED SENATE BILL 104: "AN ACT ALLOWING NEWLY LICENSED MOTOR VEHICLE OPERATORS TO TRANSPORT IMMEDIATE FAMILY MEMBERS TO AND FROM SCHOOL"

"Do you want to trust your most precious cargo to your least experienced driver?"
— Dave Preusser, Preusser Research Group

This statement has been prepared by several members of Governor Rell's 2007-08 Safe Teen Driving Task Force; participants in the Connecticut Safe Teen Driving Partnership, which meets monthly and is facilitated by the Connecticut Children's Medical Center; members of Mourning Parents Act; and other members of Connecticut's traffic safety community. Specific organizations and individuals who endorse this statement are listed at the end.

We strongly oppose S.B. 104, which would allow newly-licensed 16- and 17-year-old drivers to "transport immediate family members to and from school," for these reasons:

1. Study after study during the past decade has documented beyond argument that **crash rates of newly-licensed teen drivers increase significantly when they have one or more passengers** other than a supervising adult driver. Four such studies are attached: (a) an October 2012 report by the AAA Foundation for Traffic Safety report; (b) a 2009 study by the Insurance Institute of Highway Safety; (c) a 2007 study by Children's Hospital of Philadelphia, which specifically addresses the risks of siblings as passengers; and (d) a Fact Sheet prepared by Advocates for Auto and Highway Safety.

These are recent, national, well-documented studies by the nation's leading traffic safety organizations, and they show S.B. 104 as **directly contrary to existing evidence regarding teen driver safety.**

2. S.B. 104 reflects a fundamental misunderstanding of the dangers of teen driving. The bill appears to assume that a teenager who is duly-licensed by the State of Connecticut is a safe driver. This is simply not the case, for at least three reasons: (a) the brains of teenagers suffer from a chemical imbalance that encourages risk-taking and discourages caution, and this condition does not dissipate until ages 22 to 25; (b) it takes three to five *years* of

experience to create a safe driver, which is far more than the mere 40 hours that Connecticut requires for a license; and (c) we train new drivers on streets in their hometowns, but then they routinely drive in places they have never been before, so they are learning to handle a vehicle and navigate at the same time – a daunting challenge even for experienced drivers. Our age-of-licensing laws, unfortunately, are based more on tradition than science or traffic safety facts. **Allowing siblings as passengers of newly-licensed teen drivers is guaranteed to increase crash rates and put both teen drivers and their siblings at risk.**

3. **S.B. 104 proposes to repeal the thoroughly considered recommendation on this exact subject of the 2007-08 Task Force**, which relied on national experts and NHTSA. The Task Force's recommendation to lengthen passenger restrictions by prohibiting siblings as passengers for the first six months of licensure was a modest amendment that should not be changed without compelling evidence; as noted, the current evidence warrants, if anything, even longer restrictions on passengers and siblings than were adopted in 2008. Rolling back these provisions is simply unwarranted.

4. It appears that the underlying rationale of S.B. 104 is convenience for parents, a desire to help busy mothers and fathers with transporting their kids to school. It may be that Committee members have received calls from parents who would like to change our teen driving laws to accommodate their schedules. We can acknowledge the realities that parents are busy and much of our society is automobile-dependent, **but our teen driving laws should not put convenience ahead of safety**. Driving remains the leading cause of death of people under age 20 in the United States. S.B. 104 does not reflect an accurate understanding of the dangers of teen driving, and we encourage the Transportation Committee to reject it. Thank you.

5. Although the text of the bill is not available as of the date of this comment, the bill description raises a difficult interpretation issue – what is "to and from school?" – which will put parents, school officials, and law enforcement in the difficult position of understanding the scope of these words.

<u>STATEMENT ENDORSED BY</u>

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Teens have the highest crash rate of any group in the United States.

Characteristics of Fatal Crashes Involving 16- and 17-Year-Old Drivers with Teenage Passengers

October 2012

AAA Foundation for Traffic Safety

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Introduction

Teenage drivers are involved in more crashes per mile driven than drivers of any other age group; drivers aged 16-17 are involved in about seven times as many crashes per mile driven as drivers in their forties, fifties, or sixties (General Estimates System, 2012; National Household Travel Survey, 2011). While the oldest drivers have a higher rate of driver deaths per mile driven—mostly attributable to their increased likelihood of dying if they are involved in a crash rather than elevated risk of crash involvement—teenage drivers have the highest rates of involvement in crashes that result in the death of other people, such as their passengers, pedestrians, or drivers and passengers in other vehicles (Tefft, 2008).

Several studies have shown that the presence of passengers increases teenage drivers' risk of involvement in severe or fatal crashes, especially when the passengers are also teenagers (Chen et al., 2000; Doherty, Andrey, & MacGregor, 1998; Preusser, Ferguson, & Williams, 1998; Rice, Peek-Asa, & Kraus, 2003; Tefft, Williams, & Grabowski, 2012). All of these studies also reported that this risk increases as the number of teenage passengers increases. Interestingly, the presence of young passengers seems to increase the risk of crashes that resulted in severe injury (Rice, Peek-Asa, & Kraus, 2003) or death (Chen et al., 2000; Tefft, Williams, & Grabowski, 2012) to a greater degree than it increases the risk of less severe crashes.

This elevated risk is believed to be attributable both to in-vehicle distractions and to risk taking related to characteristics associated with adolescent development (National Research Council, 1999; 2006). A study of police reports of fatal crashes that involved 16-year-old drivers in the state of California identified cases in which passengers urged the driver to perform dangerous behaviors, cases in which passengers had physically interfered with the driver (e.g., by grabbing the steering wheel), as well as cases in which it was evident that the passengers had distracted the driver (Williams, Preusser, & Ferguson, 1998). A recent study that used in-vehicle cameras to monitor a sample of teens for their first six months of licensed driving found that although passengers did not often actively urge the driver to take risks, drivers were more likely to speed, tailgate, or show off when they had multiple teenage passengers in the vehicle (Goodwin, Foss, & O'Brien, 2012), suggesting that it was the mere presence of the passengers that affected the driver's behavior. Somewhat unexpectedly, in another study in which a different sample of newly-licensed teens was monitored using cameras and other in-vehicle data collection equipment, risky driving (as indicated by elevated g-force events, e.g., hard acceleration, braking, or swerving) was found to be less frequent in the presence of teen passengers (Simons-Morton et al., 2011).

In recent years, the predominant means by which jurisdictions have attempted to address the well-documented risks that young drivers face has been graduated driver licensing (GDL) systems. GDL systems seek to foster learning to drive under safe conditions by initially placing some restrictions on new drivers, and then relaxing the restrictions and granting more privileges as the young driver gains experience. Typically, a new driver first receives a learner's permit, and is only allowed to drive with a parent or another licensed adult in the vehicle. After holding the learner's permit for a certain amount of time, completing a specified amount of supervised driving practice, or both (specific requirements vary by state), the driver can receive an intermediate license (referred to in some states as a provisional license, a probationary license, or a junior operator's license), which allows driving without an adult in the car, but only under certain conditions. During the intermediate stage of licensure, most states prohibit driving during certain late-night hours and place a limit on the number of young passengers (e.g., under age 21) that the driver is allowed to have in the car. When the driver has had the intermediate license for a certain length of time (e.g., 6 months) or reaches a certain age (e.g., 18), the driver "graduates" to a full license with no such restrictions. It is well-established that GDL has been effective in reducing the crash involvement rates of young drivers (Shope, 2007). Studies that have investigated the effect of passenger restrictions specifically have consistently reported that they have been effective in reducing the crash involvement of young drivers carrying passengers (Chaudhary, Williams, & Nissen, 2007; McCartt et al., 2010; Fell et al., 2011).

As of the end of the study period (December 31, 2010), 42 U.S. states and the District of Columbia had some form of passenger restriction as a part of their GDL program (Insurance Institute for Highway Safety [IIHS], 2012) (Appendix A). In addition, two states—Michigan and Pennsylvania—implemented passenger restrictions between the end of the study period and the publication date of this report. As Appendix A shows, there is substantial variation among states in the number of passengers that a driver with an intermediate license is allowed to carry, as well as in the duration of the passenger restriction.

The objective of this study was to document the proportion of fatal crashes of 16- and 17-year-old drivers in which passengers were present in relation to the age, sex, and number of passengers in the vehicle, and to examine the characteristics of these crashes in relation to specific combinations of passengers. In addition, summary data on the number of fatal crashes of 16- and 17-year-old drivers with various combinations of passengers are presented on a state-by-state basis to allow identification of targets of opportunity for improvement at the state level in the implementation, refinement, or enforcement of passenger restrictions as a part of each state's overall strategy to reduce the number of teenage drivers involved in fatal motor vehicle crashes.

Methods

Data

Data on 16- and 17-year-old drivers involved in fatal crashes were obtained from the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS), a federal database of all motor vehicle crashes that occur on public roadways in the United States and result in a death within 30 days of the crash. Data from crashes that occurred in years 2005 – 2010 and involved a passenger vehicle (car, pickup truck, van, minivan, or sport utility vehicle) driven by a 16- or 17-year-old driver (referred to hereafter as *subject driver*) were analyzed.

Analysis

The data were tabulated in relation to the subject driver's age and sex, the age, sex, number of passengers in the subject driver's vehicle, and crash- and injury risk factors including the time of day, the subject driver's seatbelt use, alcohol use, licensing status, whether the driver was coded as speeding, and whether the subject driver was coded as having been at least partially responsible for the crash. For the purpose of the study, the subject driver was considered to have been using alcohol if his or her blood alcohol concentration (BAC) was greater than zero. BAC values were based on the results of alcohol tests when they were available; in cases in which BAC tests were not performed or test results were not available, BAC values imputed by NHTSA (Rubin, Shafer, & Subramanian, 1998) were used. Classification of driver alcohol use was based on both known and imputed BAC values. Although the FARS data do not contain assignment of fault, for the purpose of the study, a driver was considered to have been at least partially responsible for the crash if the crash was a single vehicle crash (involved only the subject driver's vehicle) or if the subject driver was coded as having committed an improper action or error that contributed to the crash.[1]

Data from the state of Virginia were excluded due to apparent under-reporting of the presence of passengers who were not injured. Under-reporting of uninjured passengers would bias results related to the age, sex, and number of passengers present in the subject driver's vehicle. Rice & Anderson (2009) examined FARS data from years 1996 to 2005 and found that data from several states appeared to exclude uninjured passengers. To investigate whether this problem was present in the years of data analyzed for the current study, the ratio of the proportions of passengers coded as uninjured to drivers (of any age, not limited to drivers aged 16-17) coded as uninjured was tabulated by state. The overall national ratio was 0.93, and the average state ratio was 0.95 (s.d. 0.19). Virginia, with a ratio of 0.05, was identified as likely under-reporting passengers who were not injured; the ratios ranged from 0.68 to 1.42 in all other states.

Results

There were 9,578 drivers ages 16-17 involved in fatal crashes in the United States (Virginia excluded) over the six years from 2005 through 2010. Overall, 43% had no passengers, 42% had 1 or more passengers aged 13-19 and no passengers of any other ages, and a combined 16% had any passengers younger than age 13 or older than age 19, alone or in combination with teen-aged passengers (Table 1). Although the total number of 16- and 17-year-old drivers involved in fatal crashes each year decreased by 44% over the study period—from 2,006 in 2005 to 1,124 in 2010—the proportion with teenage passengers was nearly

[1] Improper actions and errors considered indicative of at least partial responsibility for the crash included the following driver-related contributing factors coded in FARS: aggressive driving; failing to dim lights or have lights on when required; operating without required equipment; following improperly; improper or erratic lane changing; failure to keep in proper lane; illegal driving on road shoulder, sidewalk, or median; improper entry to or exit from trafficway; starting or backing improperly; opening vehicle closure into moving traffic or while vehicle was in motion; passing where prohibited; passing on wrong side; passing with insufficient distance or inadequate visibility; failing to yield to overtaking vehicle; operating vehicle in an erratic, reckless, careless, or negligent manner; speeding; failure to yield right of way; failure to obey traffic signs, traffic control devices, or traffic officers; passing through or around a barrier; failure to observe warnings or instructions on a vehicle displaying them; failure to signal; making improper turn; making right turn from left-turn lane or making left turn from right-turn lane; driving in the wrong direction on a one-way trafficway; driving on the wrong side of the road; driver inexperience; lack of familiarity with the roadway; stopping in the roadway; and over-correcting.

Table 1. 16- and 17-Year-Old Drivers Involved in Fatal Crashes in Relation to Combination of Passengers Present, by Year, Month, Day of Week, and Time of Day, United States, 2005-2010 (Virginia Excluded).

	No passengers (n=4071)	All aged 13-19 (n=3994)	All aged <13 (n=146)	Aged <13 & 13-19 (n=163)	All aged 20-29 (n=242)	Aged 13-19 & 20-29 (n=266)	At least 1 aged 30+ (n=622)	Other / unknown (n=74)	Total (n=9578)
	Row percent								N
Total	43	42	2	2	3	3	6	<1	9578
Crash year									
2005	44	42	1	2	3	3	6	<1	2006
2006	44	41	1	2	2	2	6	<1	1971
2007	42	42	2	2	3	3	7	<1	1861
2008	43	42	2	1	2	3	7	<1	1394
2009	41	41	2	2	3	3	6	2	1222
2010	41	43	2	1	2	3	6	2	1124
Crash month									
Jan/Feb/Mar	42	43	2	2	2	3	6	<1	2112
Apr/May/Jun	42	42	1	2	2	3	8	<1	2432
Jul/Aug/Sep	42	40	2	2	3	3	7	1	2561
Oct/Nov/Dec	44	42	1	2	3	3	6	<1	2473
Crash day									
Friday-Sunday	40	44	1	2	3	3	7	<1	4999
Monday-Thursday	46	39	2	2	2	2	6	<1	4579
Crash time									
5 AM–10:59 PM	43	41	2	2	2	2	7	<1	7777
11 PM–4:59 AM	39	45	0	1	5	5	4	<1	1759

Row percents may not add to 100 due to rounding.

constant over the six-year period, ranging from 41% to 43% (Table 1). There was no apparent variation by season in the distribution of passengers present in the vehicles of fatal-crash involved young drivers. Among fatal-crash involved young drivers, those who crashed on Friday, Saturday, or Sunday were more likely to have had teen-aged passengers than were those who crashed on Monday through Thursday, and those who crashed late at night (11 PM – 4:59 AM) were more likely to have had teenage passengers than were those who crashed at other times of day.

Table 2 shows passenger combinations by driver age and sex for drivers involved in fatal crashes. In each of the four driver groups, the majority (57% in all) had one or more passengers. Overall, 16-year-old males were the most likely to have had teenage passengers in the vehicle at the time of the crash (46%), and 17-year-old females were the least likely to have had teenage passengers (35%). At both ages, males were more likely than females to have been carrying teenage passengers.

Table 2. Drivers Involved in Fatal Crashes, by Driver Age, Sex, and Ages of Passengers, United States, 2005–2010 (Virginia Excluded).

	Driver age 16		Driver age 17		All
	Male (N=2311)	Female (N=1356)	Male (N=3899)	Female (N=2012)	(N=9578)
Ages of passengers	Column percent				
No passengers	39	41	43	47	43
All aged 13-19	46	41	43	35	42
All aged < 13	1	2	1	3	2
Ages <13 & 13-19	1	3	1	2	2
All aged20-29	2	2	3	3	3
Ages 13-19 & 20-29	2	2	3	4	3
At least one aged 30+	8	8	6	5	6
Other / unknown	1	1	1	1	1

Column percents may not add to 100 due to rounding.

Table 3 shows fatal crash involvements in which one or more teenage passengers and no passengers of any other ages were present, in relation to the number of teenage passengers. In the majority of cases (56% overall) only one passenger was present. These distributions changed little over the six-year period. When computed as a proportion of all young driver fatal crash involvements including those with no passengers and those with passengers of other ages, the one-teen-passenger scenario represented between 22-24% of all fatal crash involvements of 16- and 17-year-old drivers in 2005–2010; two teen passengers were present in 9–11%, and three or more were present in 7–9% of all fatal crash involvements.

Table 3. Drivers with Only Teenage Passengers, by Driver Age, Sex, and Number of Passengers, United States, 2005–2010 (Virginia Excluded).

	Driver age 16		Driver age 17		All
	Male (N=1066)	Female (N=555)	Male (N=1667)	Female (N=706)	(N=3994)
Number of passengers	Column Percent				
1	55	57	55	60	56
2	24	24	24	22	24
3+	21	19	21	18	20

Table 4 shows a clear tendency for male teen drivers in fatal crashes to have been transporting other male passengers and for females to be transporting female passengers. Same-sex driver and passenger configurations were somewhat more likely to be the case for male drivers, especially 16-year-olds (65%) compared with 60% for 17-year-old males, and 57% for both 16- and 17-year-old female drivers.

Table 4. Drivers with Only Teenage Passengers, by Number and Sex of Passengers, United States, 2005–2010 (Virginia Excluded).

	Male driver		Female driver		All
	Age 16 (N=1066)	Age 17 (N=1667)	Age 16 (N=555)	Age 17 (N=706)	(N=3994)
Number and sex of passengers	Column percent				
1 male	41	37	17	19	32
2+ male	24	22	6	5	17
1 female	14	18	40	41	24
2+ female	5	5	17	16	8
2+ male and female	17	18	19	19	18

Column percents may not add to 100 due to rounding.

Table 5 shows the ages of passengers in vehicles in which all passengers were teens, by single year of age, in relation to the age and sex of the driver. Passenger ages tended to cluster around the age of the driver—for all combinations of driver age and sex, more than 70% of all teenage passengers were within one year of the driver's age.

Table 5. Passengers in Vehicles in which All Passengers were Ages 13-19, by Driver Age, Sex, and Single Year of Passenger Age, United States, 2005–2010 (Virginia Excluded).

	Driver age 16		Driver age 17	
	Male (n=1897)	Female (n=947)	Male (n=2935)	Female (n=1185)
Passenger age	Column percent			
13	4	3	2	2
14	9	8	7	6
15	23	20	15	15
16	35	37	23	22
17	19	19	32	32
18	7	8	16	17
19	4	3	5	5

Note: n's correspond to the total number of passengers with driver of age and sex shown, not the total number of drivers.
Column percents may not add to 100 due to rounding.

Table 6 shows driver and crash characteristics in relation to driver sex and passenger configuration for 16- and 17-year-old drivers involved in fatal crashes. All risk factors examined were more common among male drivers than among females. A clear pattern emerged in which drivers with teenage passengers were more likely to have been reported in FARS as speeding, at least partially responsible for the crash, and lacking a valid license. The proportion of fatal crashes that occurred late at night also increased as the number of teenage passengers increased. Driver alcohol use followed this pattern only for male drivers.

For drivers of both sexes, alcohol use, seatbelt non-use, lack of valid license, and late-night occurrence were all most prevalent in the presence of passengers aged 20-29, alone or in combination with teen-aged passengers. Speeding was also most prevalent among male drivers with passengers aged 20-29. The proportion of drivers classified as at least partially responsible for the crash was elevated to a similar extent in the presence of passengers ages 20-29 as in the presence of multiple teen passengers. All risk factors except lack of valid license were least prevalent in the presence of passengers ages 30 and older; lack of valid license was least prevalent among drivers with no passengers.

Data for individual states and the District of Columbia are presented in Tables 7 and 8. Table 7 displays, separately for 16- and 17-year-olds, the total number of drivers involved in fatal crashes over the study period, and the number and percentages of these drivers that had passengers of any age; teen passenger(s) only; and passengers of other ages (with or without teen passengers). There is considerable variation between states in the proportion of fatal-crash-involved teen drivers who were transporting passengers, but in general the state results reflect the national data. For example, among states in which the number of 16- and 17-year-old drivers involved in fatal crashes over the study period was at least 25, the percentage with any passengers ranged from 46% to 72%; in 14 states, 60% or more had passengers. The proportion of fatal-crash-involved drivers that had teenage passengers and no passengers of other ages ranged from 31% to 56%; the percentage was between 31% and 39% in 14 states, 40-44% in 18 states, and 45-49% in 10 states. The percentage of other passenger groupings in the vehicles of 16- and 17-year-old drivers involved in fatal crashes ranged from 10% to 29%.

Table 8 shows the number of passengers (one, two, more than two) for the drivers transporting teenage passengers only. Among fatal-crash-involved drivers ages 16 and 17 with teen passengers only, the proportion with only one passenger ranged from 31% to 71%. In seven states, the majority of drivers with any teen passengers in the vehicle had multiple teen passengers.

Table 6. Characteristics of Fatal Crashes Involving 16- and 17-Year-Old Drivers, by Driver Sex and Passenger Configuration, United States, 2005-2010 (Virginia Excluded).

		Speeding	Responsible[a]	11 PM - 4:59 AM	Driver unbelted[b]	Unlicensed or invalid license	Driver BAC .01+[c]
All drivers				Row percent[d]			
No passengers	(n=4071)	30	79	17	33	9	13
1 Passenger aged 13-19	(n=2235)	38	84	16	35	12	15
2 passengers aged 13-19	(n=956)	44	87	22	34	12	17
3+ passengers aged 13-19	(n=803)	48	91	28	36	17	18
All passengers aged 20-29	(n=242)	44	85	34	41	34	35
Passengers aged 13-19 & 20-29	(n=266)	47	88	34	48	27	32
All passengers aged 30+	(n=316)	15	68	9	18	19	9
Passenger aged 30+ and others	(n=306)	23	77	15	23	23	13
Other/unknown	(n=383)	29	81	8	31	21	8
Total	(n=9578)	35	82	18	33	13	15
Male driver							
No passengers	(n=2580)	32	81	19	36	12	15
1 Passenger aged 13-19	(n=1494)	43	86	19	39	14	17
2 passengers aged 13-19	(n=665)	47	89	23	37	14	18
3+ passengers aged 13-19	(n=574)	50	93	30	37	19	22
All passengers aged 20-29	(n=145)	53	90	40	44	48	43
Passengers aged 13-19 & 20-29	(n=157)	54	89	34	52	32	37
All passengers aged 30+	(n=212)	18	70	8	21	22	10
Passenger aged 30+ and others	(n=191)	27	77	19	26	25	16
Other/unknown	(n=192)	32	81	12	35	25	9
Total	(n=6210)	38	84	21	36	16	18
Female driver							
No passengers	(n=1491)	25	75	13	28	5	10
1 Passenger aged 13-19	(n=741)	29	81	11	27	8	10
2 passengers aged 13-19	(n=291)	36	83	22	28	9	13
3+ passengers aged 13-19	(n=229)	41	88	23	32	11	10
All passengers aged 20-29	(n=97)	30	78	25	36	14	23
Passengers aged 13-19 & 20-29	(n=109)	37	85	33	41	19	24
All passengers aged 30+	(n=104)	8	65	9	10	11	5
Passenger aged 30+ and others	(n=115)	17	77	9	17	19	8
Other/unknown	(n=191)	25	82	5	28	16	7
Total	(n=3368)	28	79	14	28	9	10

a. Any driver coded as having committed one or more of selected actions or errors (see text) or involved in a single-vehicle crash responsible.

b. 7% of males and 5% of females had unknown seatbelt use, percentages based on cases with known seatbelt use only. Other column variables were missing in less than 1% of cases.

c. Based on measured and multiply-imputed values of BAC reported by NHTSA.

d. Drivers for whom column variable was present (e.g., driver speeding) as a percent of all drivers with passenger configuration in row. Column variables are not mutually exclusive, thus percents do not add to 100.

Table 7. 16- and 17-Year-Old Drivers Involved in Fatal Crashes, by State and Passenger Configuration, United States, 2005-2010 (Virginia Excluded).

	Driver age 16				Driver age 17				Total			
	Any passengers	All ages 13-19	Other ages[1]	Total	Any passengers	All ages 13-19	Other ages[1]	Total	Any passengers	All ages 13-19	Other ages[1]	Total
	N (%)	N (%)	N (%)	N	N (%)	N (%)	N (%)	N	N (%)	N (%)	N (%)	N
Alabama	96 (60)	56 (35)	40 (25)	159	91 (53)	54 (31)	37 (21)	173	187 (56)	110 (33)	77 (23)	332
Alaska	6	2	4	11	4	2	2	11	10	4	6	22
Arizona	52 (68)	37 (48)	15 (19)	77	71 (64)	52 (47)	19 (17)	111	123 (65)	89 (47)	34 (18)	188
Arkansas	33 (55)	26 (43)	7 (12)	60	53 (58)	41 (45)	12 (13)	91	86 (57)	67 (44)	19 (13)	151
California	114 (64)	86 (48)	28 (16)	178	245 (60)	173 (42)	72 (18)	410	359 (61)	259 (44)	100 (17)	588
Colorado	37 (62)	25 (42)	12 (20)	60	61 (67)	44 (48)	17 (19)	91	98 (65)	69 (46)	29 (19)	151
Connecticut	11	9	2	20	25 (57)	18 (41)	7 (16)	44	36 (56)	27 (42)	9 (14)	64
Delaware	2	2	0	5	16 (47)	10 (29)	6 (18)	34	18 (46)	12 (31)	6 (15)	39
District of Columbia	0	0	0	0	0	0		1	0	0	0	1
Florida	129 (57)	99 (44)	30 (13)	225	272 (58)	172 (37)	100 (21)	468	401 (58)	271 (39)	130 (19)	693
Georgia	98 (58)	70 (41)	28 (17)	169	125 (53)	89 (37)	36 (15)	238	223 (55)	159 (39)	64 (16)	407
Hawaii	3	2	1	4	4	1	3	7	7	3	4	11
Idaho	18 (56)	10 (31)	8 (25)	32	35 (73)	23 (48)	12 (25)	48	53 (66)	33 (41)	20 (25)	80
Illinois	108 (64)	89 (53)	19 (11)	168	91 (52)	69 (40)	22 (13)	174	199 (58)	158 (46)	41 (12)	342
Indiana	61 (53)	42 (36)	19 (16)	116	96 (59)	58 (35)	38 (23)	164	157 (56)	100 (36)	57 (20)	280
Iowa	37 (63)	26 (44)	11 (19)	59	34 (47)	21 (29)	13 (18)	73	71 (54)	47 (36)	24 (18)	132
Kansas	46 (64)	37 (51)	9 (13)	72	35 (49)	22 (31)	13 (18)	72	81 (56)	59 (41)	22 (15)	144
Kentucky	48 (64)	34 (45)	14 (19)	75	78 (50)	60 (38)	18 (12)	156	126 (55)	94 (41)	32 (14)	231
Louisiana	32 (54)	23 (39)	9 (15)	59	69 (57)	57 (47)	12 (10)	121	101 (56)	80 (44)	21 (12)	180
Maine	12	9	3	22	16 (50)	13 (41)	3 (9)	32	28 (52)	22 (41)	6 (11)	54
Maryland	22 (48)	15 (33)	7 (15)	46	54 (47)	42 (37)	12 (10)	115	76 (47)	57 (35)	19 (12)	161
Massachusetts	19 (68)	14 (50)	5 (18)	28	42 (55)	35 (46)	6 (8)	76	61 (59)	49 (47)	11 (11)	104
Michigan	73 (63)	60 (52)	13 (11)	116	100 (55)	74 (41)	26 (14)	181	173 (58)	134 (45)	39 (13)	297
Minnesota	47 (59)	37 (46)	10 (13)	80	52 (50)	40 (39)	12 (12)	103	99 (54)	77 (42)	22 (12)	183
Mississippi	50 (54)	33 (36)	17 (18)	92	62 (50)	40 (32)	22 (18)	125	112 (52)	73 (34)	39 (18)	217
Missouri	74 (52)	61 (43)	13 (9)	142	105 (56)	81 (43)	24 (13)	188	179 (54)	142 (43)	37 (11)	330
Montana	12	7	5	20	17	11	6	24	29 (66)	18 (41)	11 (25)	44
Nebraska	28 (44)	21 (33)	7 (11)	63	29 (52)	17 (30)	12 (21)	56	57 (48)	38 (32)	19 (16)	119
Nevada	24 (80)	14 (47)	10 (33)	30	25 (66)	15 (39)	10 (26)	38	49 (72)	29 (43)	20 (29)	68
New Hampshire	14	14	0	19	13	8	5	20	27 (69)	22 (56)	5 (13)	39
New Jersey	12	7	5	17	76 (61)	63 (50)	13 (10)	125	88 (62)	70 (49)	18 (13)	142
New Mexico	21 (68)	11 (35)	10 (32)	31	36 (61)	24 (41)	12 (20)	59	57 (63)	35 (39)	22 (24)	90
New York	39 (66)	27 (46)	12 (20)	59	129 (62)	103 (49)	26 (12)	209	168 (63)	130 (49)	38 (14)	268
North Carolina	104 (61)	75 (44)	29 (17)	170	121 (53)	91 (40)	30 (13)	228	225 (57)	166 (42)	59 (15)	398
North Dakota	11	8	3	20	14	6	8	21	25 (61)	14 (34)	11 (27)	41
Ohio	92 (57)	69 (43)	23 (14)	162	99 (51)	83 (42)	16 (8)	196	191 (53)	152 (42)	39 (11)	358
Oklahoma	52 (62)	37 (44)	15 (18)	84	68 (54)	52 (41)	16 (13)	126	120 (57)	89 (42)	31 (15)	210
Oregon	19 (58)	14 (42)	5 (15)	33	24 (59)	16 (39)	8 (20)	41	43 (58)	30 (41)	13 (18)	74
Pennsylvania	61 (67)	46 (51)	15 (16)	91	148 (57)	118 (46)	30 (12)	258	209 (60)	164 (47)	45 (13)	349
Rhode Island	4	4	0	5	8	7	1	17	12	11	1	22
South Carolina	46 (60)	28 (36)	18 (23)	77	76 (54)	43 (30)	33 (23)	141	122 (56)	71 (33)	51 (23)	218
South Dakota	12	6	6	19	13 (45)	9 (31)	4 (14)	29	25 (52)	15 (31)	10 (21)	48
Tennessee	74 (60)	61 (50)	13 (11)	123	88 (49)	67 (38)	21 (12)	178	162 (54)	128 (43)	34 (11)	301
Texas	212 (66)	154 (48)	58 (18)	319	277 (56)	192 (39)	85 (17)	497	489 (60)	346 (42)	143 (18)	816
Utah	21 (62)	18 (53)	3 (9)	34	27 (57)	18 (38)	9 (19)	47	48 (59)	36 (44)	12 (15)	81
Vermont	8	5	3	11	6	5	1	10	14	10	4	21
Washington	32 (59)	25 (46)	7 (13)	54	52 (57)	44 (48)	8 (9)	92	84 (58)	69 (47)	15 (10)	146
West Virginia	18 (60)	14 (47)	4 (13)	30	19 (50)	12 (32)	7 (18)	38	37 (54)	26 (38)	11 (16)	68
Wisconsin	53 (55)	40 (42)	13 (14)	96	79 (59)	69 (52)	10 (8)	133	132 (58)	109 (48)	23 (10)	229
Wyoming	17 (68)	12 (48)	5 (20)	25	13	9	4	21	30 (65)	21 (46)	9 (20)	46
Total	2214 (60)	1621 (44)	593 (16)	3667	3293 (56)	2373 (40)	919 (16)	5911	5507 (57)	3994 (42)	1512 (16)	9578

Percents based on total of fewer than 25 drivers (shown in gray) may be unstable and should be interpreted with caution.

1. Includes any driver with passengers younger than 13 or older than 20, irrespective of presence of teenage passengers.

Table 8. 16- and 17-Year-Old Drivers in Fatal Crashes With Only Teenage Passengers, by State and Number of Passengers, United States, 2005-2010 (Virginia Excluded).

	Driver age 16				Driver age 17				Total			
	1	2	3+	Total	1	2	3+	Total	1	2	3+	Total
	N (%)	N (%)	N (%)	N	N (%)	N (%)	N (%)	N	N (%)	N (%)	N (%)	N
Alabama	36 (64)	10 (18)	10 (18)	56	28 (52)	14 (26)	12 (22)	54	64 (58)	24 (22)	22 (20)	110
Alaska	1	1	0	2	2	0	0	2	3	1	0	4
Arizona	23 (62)	5 (14)	9 (24)	37	29 (56)	11 (21)	12 (23)	52	52 (58)	16 (18)	21 (24)	89
Arkansas	14 (54)	5 (19)	7 (27)	26	27 (66)	11 (27)	3 (7)	41	41 (61)	16 (24)	10 (15)	67
California	40 (47)	23 (27)	23 (27)	86	80 (46)	47 (27)	46 (27)	173	120 (46)	70 (27)	69 (27)	259
Colorado	11 (44)	5 (20)	9 (36)	25	30 (68)	6 (14)	8 (18)	44	41 (59)	11 (16)	17 (25)	69
Connecticut	5	2	2	9	6	8	4	18	11 (41)	10 (37)	6 (22)	27
Delaware	1	0	1	2	5	4	1	10	6	4	2	12
District of Columbia	0	0	0	0	0	0	0	0	0	0	0	0
Florida	56 (57)	20 (20)	23 (23)	99	104 (60)	41 (24)	27 (16)	172	160 (59)	61 (23)	50 (18)	271
Georgia	38 (54)	22 (31)	10 (14)	70	55 (62)	17 (19)	17 (19)	89	93 (58)	39 (25)	27 (17)	159
Hawaii	0	0	2	2	1	0	0	1	1	0	2	3
Idaho	7	2	1	10	16	3	4	23	23 (70)	5 (15)	5 (15)	33
Illinois	45 (51)	19 (21)	25 (28)	89	38 (55)	17 (25)	14 (20)	69	83 (53)	36 (23)	39 (25)	158
Indiana	23 (55)	10 (24)	9 (21)	42	29 (50)	19 (33)	10 (17)	58	52 (52)	29 (29)	19 (19)	100
Iowa	15 (58)	5 (19)	6 (23)	26	12	4	5	21	27 (57)	9 (19)	11 (23)	47
Kansas	16 (43)	14 (38)	7 (19)	37	16	2	4	22	32 (54)	16 (27)	11 (19)	59
Kentucky	18 (53)	9 (26)	7 (21)	34	41 (68)	9 (15)	10 (17)	60	59 (63)	18 (19)	17 (18)	94
Louisiana	11	7	5	23	32 (56)	16 (28)	9 (16)	57	43 (54)	23 (29)	14 (18)	80
Maine	5	3	1	9	8	2	3	13	13	5	4	22
Maryland	10	2	3	15	20 (48)	11 (26)	11 (26)	42	30 (53)	13 (23)	14 (25)	57
Massachusetts	9	4	1	14	17 (49)	6 (17)	12 (34)	35	26 (53)	10 (20)	13 (27)	49
Michigan	32 (53)	14 (23)	14 (23)	60	37 (50)	23 (31)	14 (19)	74	69 (51)	37 (28)	28 (21)	134
Minnesota	23 (62)	9 (24)	5 (14)	37	23 (58)	10 (25)	7 (18)	40	46 (60)	19 (25)	12 (16)	77
Mississippi	18 (55)	12 (36)	3 (9)	33	21 (53)	15 (38)	4 (10)	40	39 (53)	27 (37)	7 (10)	73
Missouri	38 (62)	11 (18)	12 (20)	61	48 (59)	19 (23)	14 (17)	81	86 (61)	30 (21)	26 (18)	142
Montana	2	2	3	7	6	0	5	11	8	2	8	18
Nebraska	16	4	1	21	11	2	4	17	27 (71)	6 (16)	5 (13)	38
Nevada	8	3	3	14	9	1	5	15	17 (59)	4 (14)	8 (28)	29
New Hampshire	8	5	1	14	5	2	1	8	13	7	2	22
New Jersey	2	4	1	7	29 (46)	18 (29)	16 (25)	63	31 (44)	22 (31)	17 (24)	70
New Mexico	5	3	3	11	11	8	5	24	16 (46)	11 (31)	8 (23)	35
New York	17 (63)	7 (26)	3 (11)	27	45 (44)	28 (27)	30 (29)	103	62 (48)	35 (27)	33 (25)	130
North Carolina	48 (64)	19 (25)	8 (11)	75	54 (59)	18 (20)	19 (21)	91	102 (61)	37 (22)	27 (16)	166
North Dakota	5	1	2	8	4	1	1	6	9	2	3	14
Ohio	39 (57)	20 (29)	10 (14)	69	56 (67)	19 (23)	8 (10)	83	95 (63)	39 (26)	18 (12)	152
Oklahoma	23 (62)	7 (19)	7 (19)	37	33 (63)	9 (17)	10 (19)	52	56 (63)	16 (18)	17 (19)	89
Oregon	6	4	4	14	10	4	2	16	16 (53)	8 (27)	6 (20)	30
Pennsylvania	22 (48)	11 (24)	13 (28)	46	67 (57)	24 (20)	27 (23)	118	89 (54)	35 (21)	40 (24)	164
Rhode Island	1	3	0	4	5	1	1	7	6	4	1	11
South Carolina	17 (61)	7 (25)	4 (14)	28	22 (51)	12 (28)	9 (21)	43	39 (55)	19 (27)	13 (18)	71
South Dakota	3	2	1	6	8	0	1	9	11	2	2	15
Tennessee	38 (62)	14 (23)	9 (15)	61	49 (73)	10 (15)	8 (12)	67	87 (68)	24 (19)	17 (13)	128
Texas	89 (58)	32 (21)	33 (21)	154	107 (56)	42 (22)	43 (22)	192	196 (57)	74 (21)	76 (22)	346
Utah	6	2	10	18	5	6	7	18	11 (31)	8 (22)	17 (47)	36
Vermont	2	3	0	5	3	1	1	5	5	4	1	10
Washington	15 (60)	3 (12)	7 (28)	25	24 (55)	15 (34)	5 (11)	44	39 (57)	18 (26)	12 (17)	69
West Virginia	8	5	1	14	7	3	2	12	15 (58)	8 (31)	3 (12)	26
Wisconsin	21 (53)	13 (33)	6 (15)	40	34 (49)	23 (33)	12 (17)	69	55 (50)	36 (33)	18 (17)	109
Wyoming	5	4	3	12	5	2	2	9	10	6	5	21
Total	901 (56)	392 (24)	328 (20)	1621	1334 (56)	564 (24)	475 (20)	2373	2235 (56)	956 (24)	803 (20)	3994

Percents based on total of fewer than 25 drivers (shown in gray) may be unstable and should be interpreted with caution.

Discussion

In 1995, there were 2,667 drivers aged 16-17 involved in fatal crashes. In 2010, there were 1,150 (FARS, 2012), representing a decrease of 57% over this period. The raw number of fatal crashes of teen drivers who were carrying teenage passengers has decreased similarly, but the proportion of fatal-crash-involved 16- and 17-year-old drivers who had teenage passengers decreased only slightly over the same period, from 46% in 1995 to 43% in 2010. "Teens with teens" clearly remains a dominant fatal crash scenario, despite numerous states introducing passenger restrictions or upgrading existing ones during this period.

One goal of the present study was to provide a fuller picture of the involvement of passengers in teen driver crashes than has been available before, providing a focus on the remaining part of the problem that most states have attempted to address through various forms of restrictions. This was done by computing counts of drivers in crashes with different combinations of passengers, by age and sex of drivers and passengers. There were few surprises. Aside from crashes in which no passengers were present, crashes in which all passengers were teenagers were by far the most common: of fatal-crash-involved drivers with any passengers, 73% of 16-year-old drivers and 72% of 17-year-olds were carrying only teenage passengers, with no young children and no adults aged 20 or older in the vehicle. Male drivers tended to have mostly male passengers, female drivers most commonly had female passengers, and roughly 70% of all teenage passengers were within one year of the age of the driver. In the majority of such crashes, the driver had only one teenage passenger in the vehicle, but drivers with two or more teenage passengers represented close to half of all fatal-crash-involved drivers with any teenage passengers overall, and more than half in several states.

Drivers transporting passengers ages 30 and older were less likely than drivers alone or with younger passengers of any age to have been reported to have been speeding, unbelted, to have had detectable alcohol, to have crashed late at night, or to have committed an unsafe action or error suggestive of at least some degree of responsibility for the crash. These low risk profiles seem to be indicative of more responsible driving when traveling with parents and other adults, consistent with the finding of Tefft, Williams, & Grabowski (2012) that deaths per mile driven of 16- and 17-year-old drivers were more than 60% lower when an adult passenger (defined in that study as aged 35 or older) was present than when the driver was alone.

Consonant with the known increased crash risk when transporting teen passengers, particularly multiple passengers, many of these risk factors (speeding, late night driving, crash responsibility, lack of valid license, and alcohol use) were more likely to be present with teen passengers present, and increased as the number of teen passengers increased. Somewhat unexpectedly, however, several of these risk factors—specifically speeding, late night driving, seatbelt nonuse, lack of valid license, and alcohol use—were most prevalent in the presence of passengers aged 20-29. Chen et al. (2000) reported that crashes of teenage drivers carrying passengers in their twenties tended to be more severe (the rate of driver deaths per police-reported crash was higher), and Ouimet et al. (2010) reported elevated risk of fatal crash involvement per mile driven in the presence of a passenger aged 20-29. However, the presence of passengers aged 20-29 in the vehicles of fatal-crash-involved drivers aged 16-17 was very rare: they were present alone or in combination with younger passengers in a total of only 5% of all fatal crashes of drivers aged 16-17, whereas all passengers were aged 13-19 in over 40% of cases.

A second purpose of the study was to provide state-by-state data on the prevalence of fatal crashes involving teen drivers with teen passengers. The data generally indicate that passengers are present in a large proportion of teen driver fatal crashes in all states. States without passenger restrictions can use the data presented here to examine the extent to which the fatal crashes of 16- and 17-year olds involve various combinations of passengers. States with passenger restrictions can use these data to examine the overall contribution of crashes involving passengers, and the extent to which they do or do not fall under the provisions of their law. Note, however, that these data are intended only to help states to assess the magnitude of the safety problem posed by teenage drivers carrying teenage passengers and to identify targets of opportunity for improvement. These data alone are insufficient to draw conclusions regarding the effectiveness of existing state laws, due to limitations of the data as well as complexities of many states' laws.

It could not be determined from the data analyzed in this study whether a given individual driver was in violation of applicable passenger restrictions. One reason for this is that several states have different restrictions applicable to different drivers, usually depending on the amount of time the driver has held a license (e.g., no more than one passenger allowed during the first 6 months of licensed driving, then up to three passengers allowed during months 6-12, and no limits imposed after 12 months of licensed driving); thus, it is not possible to determine from available information (i.e., age and licensing status) what passenger restriction, if any, was applicable to many of the drivers in the data. In addition, most states allow drivers who are otherwise covered by a passenger restriction to transport members of their family, including teenage siblings. The data analyzed in the current study contains no information about the relationship between the driver and passengers; thus, in a state that allows a driver bound by a passenger restriction to transport his or her siblings, it was not possible to determine whether or not the presence of teenaged passengers constituted a violation of any possibly-applicable restriction.

Although most U.S. states now have some form of passenger restriction in effect for some young drivers, many of these are rather weak. A few states have nominal restrictions that allow a young driver to carry two or even three passengers. Tefft, Williams, & Grabowski (2012) showed that compared to having no passengers, having two passengers under age 21 (and no older passengers) approximately doubles a 16- or 17-year-old driver's risk per mile driven of being killed in a crash, and having three or more passengers under age 21 more than quadruples the risk.

In addition, the ages of passengers covered by passenger restrictions varies by state. Eighteen states restrict passengers of all ages, 1 state only restricts passengers under age 17, 10 states restrict passengers under age 18, three states restrict passengers under age 19, five states restrict passengers under age 20, five states restrict passengers under age 21, and 1 state restricts passengers under age 25 (see Appendix). From the standpoint of safety, restricting all passengers—including adults—does not appear justified. Tefft, Williams, and Grabowski (2012) found that having an adult passenger aged 35 or older in the vehicle decreased a young driver's risk per mile driven of being killed in a crash by 62% and decreased the risk of involvement in any crash by 46% compared to driving with no passengers. On the other hand, Chen et al. (2000) did find that teen drivers' crashes were more likely to be fatal when passengers aged 20-29 were present, and the current study found that several risk factors, including late-night driving, speeding, and driver alcohol use were more prevalent in fatal crashes of teen drivers when passengers aged 20-29 were present. Unfortunately, no research exists comparing the effects of passenger restrictions applicable to passengers of different ages. AAA recommends that state GDL programs should allow no more than one passenger under age 21 for the first six months of driving (AAA, 2012).

The Insurance Institute for Highway Safety (2012a) recommends that passenger restrictions should be applicable to all drivers under age 18. In most states, many drivers graduate from the passenger restriction prior to their 18th birthday, and in some states, some drivers can graduate from the passenger restriction prior to their 17th birthday. In 11 states, graduation from passenger restrictions is permitted at an earlier age than graduation from restrictions on nighttime driving; only one state allows earlier graduation for the nighttime driving restriction. Many states specify a time period for the passenger restriction, such as the first 6 or 12 months of the intermediate period, so depending on the age at which a person obtains an intermediate license, he or she could be subject to the restrictions well beyond the minimum age.

Strengthening passenger restrictions can involve a tradeoff with compliance. That issue has received most attention in regard to the number of young passengers allowed. Prohibiting all young passengers theoretically is stronger than allowing one passenger, but the relationship between the number of passengers allowed under the law and compliance with the law is unknown. If young people are less likely to comply with a passenger restriction that does not allow any passengers than with a passenger restriction that allows one, this would at least partially blunt the effectiveness of the law. In one national study, a 21% reduction in the fatal crash rate of 13- to 17-year-olds was found when beginners were prohibited from having any passengers, whereas allowing one passenger reduced the rate by only 7% (McCartt et al., 2010). In contrast, another national study found maximum safety benefits when one passenger was permitted, but found no benefits associated with passenger restrictions that prohibited all passengers (Masten, 2011). While it is well-established that passenger restrictions as a whole have been associated with decreases in fatal crashes of young drivers, more research is needed to determine what specific form of passenger restriction is optimal (e.g., number of passengers allowed, ages of passengers exempted, whether family members are exempted, duration of passenger restriction, etc.)

Siblings of the driver are exempted from passenger restrictions in almost all states, partly because of likely noncompliance and primarily to make the law more palatable to legislators. It is not clear the extent to which siblings affect crash risk compared with teen friends of the driver. One study of crashes in which child passengers were riding with teen drivers found that the child passenger was less likely to be injured if the driver was a sibling than if the driver was another teenager, although the risk was much higher in either case than when the driver was an adult (Senserrick, Kallan, & Winston, 2007). Another study that used in-vehicle cameras to monitor a sample of newly-licensed drivers found that potentially-risky driving behaviors and high g-force events (e.g., hard acceleration, braking, swerving) were elevated to a smaller degree when young passengers were siblings than when they were non-sibling peers (Goodwin, Foss, & O'Brien, 2012).

Although more research is needed to determine what specific form of passenger restriction is optimal, it seems logical to expect that strengthening the restrictions, e.g., by allowing fewer passengers (especially in the case of states that presently allow as many as three or more) and keeping the restrictions in effect for a longer period of time would be beneficial. Of note, a recent national survey of parents of 15- to 18-year-olds found that 89% approved of passenger restrictions in general, and of this group, about half thought they should remain in effect until age 18 (Williams, Braitman, & McCartt, 2011).

Statement before the Maryland Senate Committee on Judicial Proceedings on Senate Bill 265

Passenger and Nighttime Restrictions for Young Drivers

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February 24, 2009

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The Insurance Institute for Highway Safety is a nonprofit research and communications organization that identifies ways to reduce the deaths, injuries, and property damage on our nation's highways. We are supported by the nation's automobile insurers. I am submitting for the record research on crash risks when young drivers transport other teenage passengers and when they drive at night.

Driving with passengers

Most teenagers who are fatally injured are drivers, but many teens also die as passengers. In Maryland, 39 percent of the motor vehicle deaths of 16-19 year-olds during 1998-2007 were passengers. Among 16 year-olds, the split was close to 50-50 (51 percent drivers, 49 percent passengers) (Table 1). In addition, 76 percent of the 16-year-old passengers killed were in vehicles driven by teenage drivers (Table 2).

Table 1
Number of fatally injured passenger vehicle drivers and passengers in Maryland, 1998-2007

Age	Drivers	Passengers
16	62	59
17	103	59
18	91	64
19	97	48
Total	353	230

Table 2
Percentage of teenage passengers fatally injured in vehicles driven by teenage drivers (ages 16-19) in Maryland, 1998-2007

Age	Number of passengers	Percentage of passengers killed
16	59	76%
17	59	73%
18	64	59%
19	48	48%

A major risk factor for teenage drivers is passenger presence, especially teenage passengers. For older drivers, passenger presence either has no effect on crash risk or decreases it; but for young drivers, passengers greatly magnify the risk. That is, teenagers' already high fatal crash risk when driving alone increases dramatically when passengers are added (Figure 1).[1]

The reasons are obvious. Teenage passengers create distractions for drivers who are inexperienced to start with and who need to be paying full attention to the driving task. Plus the presence of peers in the vehicle often induces young drivers to take risks.

BRIEF REPORT

Child passenger injury risk in sibling versus non-sibling teen driver crashes: a US study

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Several international jurisdictions allow family exemptions to graduated driver licensing passenger restrictions. The objective of this research was to examine differences in injury risk to US child passengers in crashes involving sibling versus non-sibling teen drivers, and to compare outcomes with crashes involving adult drivers. Insurance claim and telephone survey data were collected on 16 233 child passengers (representing 289 329 children) in 17 US jurisdictions. There was a trend toward higher restraint non-use by child passengers in the non-sibling group than in the sibling group (9.6% vs 4.7%; p=0.08). Children in the sibling group had a 40% lower risk of injury than those in the non-sibling group (adjusted OR 0.60, 95% CI 0.40 to 0.90); however, injury risk was higher in the sibling group than in children traveling with adults (adjusted OR 1.57, 95% CI 1.09 to 2.26). Child passengers riding with sibling teen drivers may be safer than those riding with non-sibling teens, but not as safe as those riding with adult drivers.

Restrictions on the number of passengers newly licensed teens can carry in the absence of an adult supervisory driver have been shown to be effective in reducing injury risk.[1–3] Several US states and New Zealand include passenger restrictions in their graduated driver licensing laws that allow exemption for family members.[4] These are also under consideration in several Australian jurisdictions. Whether the relationship between teen drivers and their passengers, comparing siblings versus peers, makes a difference to injury risk has, however, not yet been explored.

We aimed to examine the association between the relationship of teen drivers (sibling vs non-sibling) with their child passengers and the risk of injury to children in a US sample. Secondarily, we aimed to compare the characteristics and outcomes of these child passengers in crashes involving teen drivers with those involving adult drivers.

METHODS

Data were collected as part of an ongoing prospective study from 1 December 2000 to 31 December 2005 via insurance claim records and a validated telephone survey.[5] Inclusion criteria included State Farm-insured passenger vehicles, model year 1990 and newer (to represent the modern passenger vehicle fleet), with at least one child passenger aged $\leqslant$15 years. The crashes examined occurred in 16 US states and the District of Columbia, representing 3 large regions (East: New York, New Jersey (until November 2001), Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North Carolina and the District of Columbia; Midwest: Ohio, Michigan, Indiana and Illinois; and West: California, Nevada, Arizona and Texas (from June 2003)).

The main outcome variable of interest was injury risk. Injuries were defined as those with Abbreviated Injury Scale scores of $\geqslant$2, including concussions and more serious brain injuries, facial bone fractures, spinal cord injuries, internal organ injuries and extremity fractures.

A stratified cluster sample was designed to select vehicles (the unit of sampling) for conducting telephone surveys with the driver. Probability sampling was based on two criteria: whether the vehicle was towed from the scene or not, and the level of medical treatment received by the child passenger(s). If a vehicle was sampled, the cluster of all child passengers in that vehicle was included in the survey. A 2.5% sample of crashes in which children received no medical treatment was also included to maintain the representativeness of the sample.

Figure 1 details the derivation of the study sample from the initial eligible population. Claim representatives correctly identified 98% of eligible vehicles. Of the 240, 379 cases selected: full crash data were obtained with consent for 64% of cases; in 9% of cases policyholders could not be contacted or only partial data were received; and there was a 27% refusal rate. Of the policyholders who consented, 16% were sampled for an interview, 76% of whom were successfully contacted and screened for the full survey. A full survey was obtained for 10 704 crashes. A comparison of the sample with known population values from State Farm claims showed minimal differences for the following factors: geographic region of the insured vehicle, vehicle type, non-drivability after the crash and mean age of the child occupants.[6] When compared with the 2000 United State Census, study participants had a similar distribution of race and ethnicity and family income, and a slightly higher level of education than the driver.[7]

To assess differences in the distribution of passenger and driver characteristics by classification of driver, Pearson's χ^2 tests were used. The adjusted relative risks of injury for children in crashes comparing the three driver classifications were computed, producing point estimates of the risk with associated 95% CIs. In examining injury risks, we also controlled for variables that have previously been shown to predict injury to child passengers. These included age (0–8, 9–12 and 13–15 years), seating row (front vs rear), restraint status (yes or no), gender of driver, and vehicle type (passenger car, cargo van, pickup truck, sport utility vehicle and minivan).

As sampling was based on the likelihood of an injury, subjects least likely to be injured were under-represented in the study sample in a manner potentially associated with the predictors of interest. To account for the stratification of subjects by medical treatment, towaway status of the vehicle, clustering of subjects by vehicle and the disproportional probability of selection, Taylor Series linearization estimates of the logistic regression parameter variance were calculated using SAS-callable SUDAAN V.9.0 (Research Triangle Institute, Research Triangle Park, North Carolina, USA, 2006). Because injury is a relatively rare event, the odds ratio (OR) can be interpreted as a good estimate of relative risk.

All protocols were approved by the institutional review boards of The Children's Hospital of Philadelphia and the University of Pennsylvania.

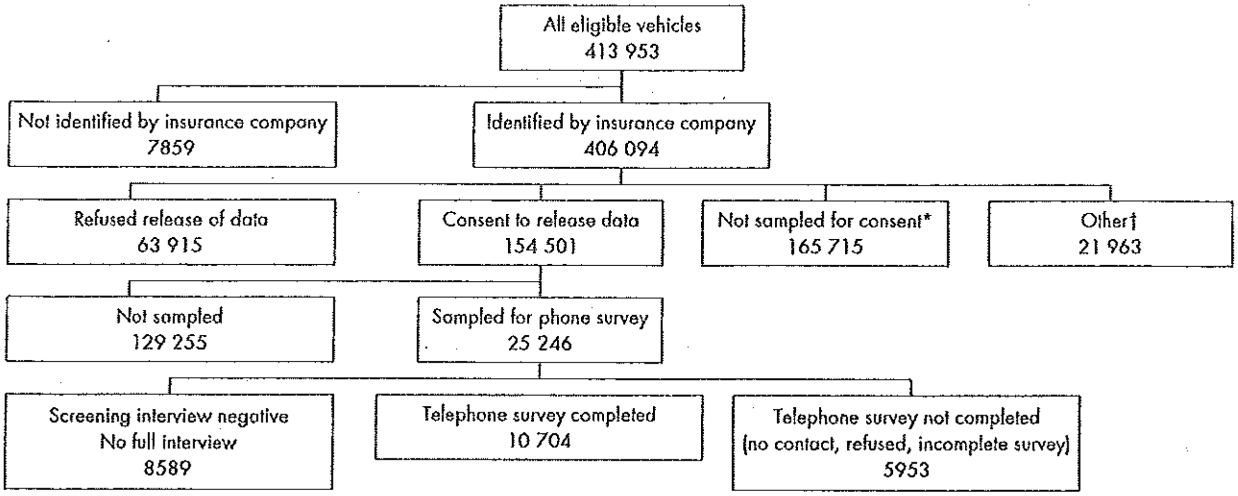

Figure 1 Derivation of study sample from initially eligible population (12 December 2000–31 December 2005). *At the onset of the project, consent was obtained from all eligible subjects before sampling. Beginning in June 2003, sampling of eligible subjects was performed, thus restricting consent to those who would go on to the screening interview. †Other includes refusals, failure to contact the subject and incomplete data collection. Child passengers were classified into three groups based on the status of the driver: (1) sibling teen drivers—drivers aged 15–19 years with at least one sibling in the vehicle and all passengers aged <21 years (common age limit of passenger restrictions); (2) non-sibling teen drivers—drivers aged 15–19 years without a sibling in the vehicle and all passengers aged <21 years; and (3) adult drivers—drivers aged at least 21 years or drivers aged <21 years who were parents (as injury risk did not differ for these groups: 1.10% and 1.01%, respectively). Cases excluded from the analysis included those in which passengers were of unknown age or seating row; drivers were aged <15 years or of unknown age or gender; drivers were teens with an unknown relationship with the child passenger or had at least one passenger aged ≥21 years present; drivers were 20 years of age and not a parent; and crashes were classified as "no collision". In all, 609 child passengers were excluded.

RESULTS

Complete interview data were obtained for 16 233 children, representing 289 329 child passengers in the study population. Table 1 summarizes passenger and driver characteristics by driver classification group.

The distribution of child passengers among the driver classifications was adult drivers 96.1%, sibling teen drivers 2.3% and non-sibling teen drivers 1.5%. Limited solely to the two teen driver groups, 60% of child passengers were driven by siblings. In general, child passengers of adult drivers were much younger, and in turn less likely to be unrestrained and seated in the front, than those driven by either teen driver group. Within the teen driver groups, there was a trend toward higher restraint non-use among child passengers in the non-sibling group than among the sibling group.

Table 2 summarizes child passenger injury risk and unadjusted and adjusted ORs for the three driver classifications. Injuries were reported in 2148 sampled children, representing an estimated 3504 children or 1.2% of the study population (1.1% with adult drivers, 3.3% with sibling teen drivers and 5.6% with non-sibling teen drivers).

Child passengers traveling with either teen driver group were at a significantly higher risk of injury than those traveling with adult drivers, even after adjusting for age, seating row, restraint status of child passenger, gender of driver and vehicle type. When we limit the comparison to the crashes involving teen

Table 1 Child passenger and driver characteristics (weighted %, unweighted n) by three driver classifications and comparisons for sibling versus non-sibling teen drivers

Characteristic	Adult driver (n = 14 782)	Sibling teen driver (n = 715)	Non-sibling teen driver (n = 736)	p Value*
Child age (years)				
0–8	62.4 (8292)	8.5 (43)	13.2 (68)	0.001
9–12	23.5 (3954)	18.7 (145)	7.5 (50)	
13–15	14.1 (2536)	72.8 (527)	79.3 (618)	
Male driver	27.9 (4114)	30.3 (251)	45.8 (404)	0.02
No child restraint	2.1 (630)	4.7 (87)	9.6 (165)	0.08
Seating row				
Front	19.1 (3658)	64.9 (420)	52.5 (376)	0.02
Vehicle type				
Passenger car	43.6 (7047)	76.1 (526)	74.2 (538)	0.28
Cargo van	1.9 (297)	0.9 (3)	0.3 (4)	
Pickup truck	7.2 (1001)	4.4 (43)	11.0 (64)	
Sport utility	24.2 (3251)	13.4 (92)	11.2 (93)	
Minivan	23.2 (3186)	5.3 (51)	3.3 (37)	

*Comparison of the distribution of characteristics (χ^2 test) across the two teen driver classifications only.

Table 2 Abbreviated Injury Scale (AIS) ≥2 injury risk, and crude and adjusted ORs of AIS ≥2 injury by classification of driver

Driver classification	Injury risk, % (unweighted n)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)*
Adult	1.1 (1755)	1.00 (reference)	1.00 (reference)
Sibling teen	3.3 (172)	3.08 (2.26 to 4.22)	1.57 (1.09 to 2.26)
Non-sibling teen	5.6 (221)	5.41 (3.96 to 7.39)	2.62 (1.83 to 3.76)
Sibling teen vs non-sibling	NA	0.57 (0.38 to 0.85)	0.60 (0.40 to 0.90)

AIS, Abbreviated Injury Scale; NA, not applicable.
*Adjusted for age, seating row, restraint status of child passenger, gender of driver and vehicle type.

drivers, child passengers in the sibling group were at a 40% lower risk of injury than those in the non-sibling group (adjusted OR 0.60, 95% CI 0.40 to 0.90).

DISCUSSION

This study is the first study to explore differences in injury risk for children traveling with teen drivers who are siblings versus other relationships. We found a trend toward more children being unrestrained in crashes involving non-sibling teen drivers and a higher injury risk for these children than crashes involving sibling teen drivers. However, the adjusted injury risk for the sibling group was still approximately 1.5 times that of children in crashes involving adult drivers. (For the non-sibling group, this risk was 2.5 times greater.) Therefore, our findings indicate that the child passengers of sibling teens may be safer than those of non-sibling teens, but not as safe as when riding with adults.

Studies in other teen risk domains demonstrate negative influences of siblings on adolescent risk behaviors,[4] with sibling influence sometimes stronger than parental[9] or peer influence.[10] Therefore, parents should consider the risk-taking nature of the siblings when assessing whether they should ride together without an adult.

Parents should also consider whether the planned drive involves a specific destination. Research has shown that recreational driving without a predetermined destination results in a higher crash risk than purposeful trips, such as to school or to work.[11] Such differences among the sibling versus non-sibling group may have influenced our findings; however, these data were not collected. If riding with siblings more often includes purposeful trips than with non-siblings, this may have contributed to the lower injury risk found for our sibling group.

Limitations associated with the use of volunteer insurance claimants as participants and reliance on report of drivers include potential selection and misclassification biases. Comparison between the included sample and the eligible population, however, demonstrated little difference in several key characteristics of relevance to the study, suggesting that the impact of potential selection bias on our results was likely to be limited. Ongoing comparisons of driver-reported child restraint and seating position data to that obtained by on-site crash investigations have also demonstrated a high degree of agreement ($\kappa = 0.56$ for any restraint use), and our findings for these are similar to those of other recently reported population-based studies,[12] suggesting that misclassifications may also be limited.

Our analyses focused on injury risk in the event of a crash, not on exposure-adjusted crash rates. We could not calculate the rate of crash involvement per miles driven with child passengers for the different age groups of drivers. Likewise, we could not determine whether non-sibling teen driving is more frequent than sibling teen driving or, for example, more frequent specifically during night-time hours when crash risk is higher, which could contribute to the higher injury risk found for child passengers of non-sibling teens. Such analyses are important for more conclusive findings and would further inform whether family exemptions on passenger restrictions are justified. Future research should also examine differences by trip purpose, as well as by jurisdictions with and without passenger restrictions and family exemptions, and by passenger age groups (eg, 8–12 vs 13–15 years). There were too few cases among the teen driver groups to explore such differences in the present study.

Implications for prevention

Our findings provide cautioned support for child passenger carriage by sibling teens relative to non-sibling teens, while recognizing that the safest alternative is to ride with an adult. Further research is needed to understand why riding with a sibling teen may be safer than riding with a non-sibling teen, and under what circumstances.

Family exemptions can allow passenger restrictions to be more readily accepted by both parents and policy makers, and may be an important first step for jurisdictions with no restrictions. Parents, pediatricians, advocates and legislators should recognize riding with sibling teens as potentially safer than riding with non-sibling teens, but not as safe as riding with an adult, and should continue to seek increased restraint use regardless of whether traveling with siblings, other teens or adults.

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Key points

- There was a trend toward higher restraint non-use by children in crashes involving non-sibling teen drivers than those involving sibling teen drivers (9.6% vs 4.7%, respectively; $p = 0.08$).
- Children in the sibling group had a 40% lower risk of injury than those in the non-sibling group (adjusted OR 0.60, 95% CI 0.40 to 0.90); however, injury risk was higher in the sibling group than in children traveling with adults (adjusted OR 1.57, 95% CI 1.09 to 2.26).
- Our findings indicate that child passengers of sibling teens may be safer than those of non-sibling teens, but not as safe as those with adult drivers.

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The sponsor contributed to data collection. The sponsor did not contribute to the design, data management, analysis and interpretation of the data, or to preparation, review or approval of the manuscript.

TMS, MJK and FKW had full access to all of the data in the study and take full responsibility for the integrity of the data and the accuracy of the data analysis. TMS, MJK, FKW were involved on conception and design of the study, analysis and interpretation of data, drafting of the manuscript, critical revision of the manuscript for important intellectual content and provided final approval for publication.

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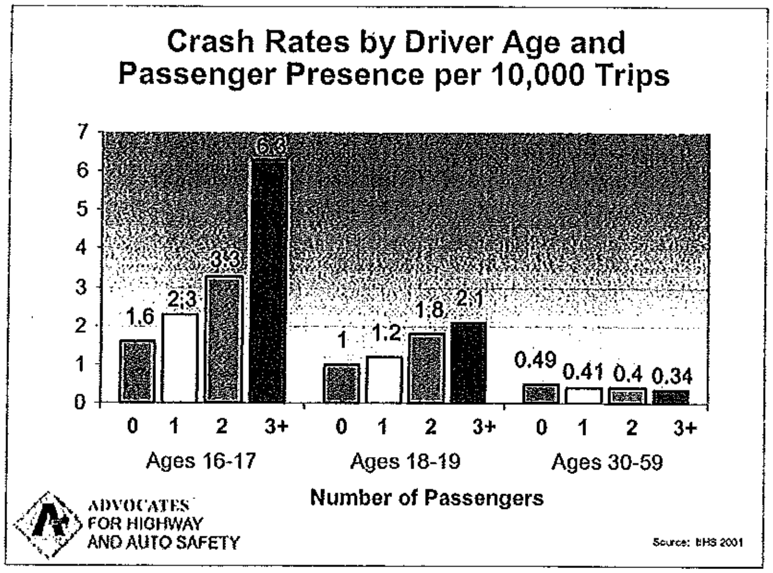
Graduated Driver Licensing (GDL) and Teen Drivers:
Passenger Restrictions

Teen drivers are far more likely than other drivers to be involved in fatal motor vehicle crashes because they lack driving experience and tend to take greater risks due to their immaturity. GDL provides a structure in which beginning drivers gain substantial driving experience in less-risky situations and has proven to be effective in reducing young driver crash fatalities. One component within GDL is to restrict the number of non-familial passengers during the first months of licensure.

THE STATISTICS



Currently only 44 states have a three stage Graduated Driver Licensing program. Of those states, only 29 states have an optimal passenger restriction provision (no more than one non-familial teenage passenger).

According to the National Highway Traffic Safety Administration (NHTSA), over half of 16- and 17-year-old drivers involved in fatal crashes were carrying passengers younger than 21. **Mayhew D. "Reducing the Crash Risk for Young Drivers". June 2006**

Between 1995 and 2004, 16- and 17-year-old drivers were involved in 24,704 fatal crashes, resulting in the deaths of 10,445 of these drivers, 8,925 of their passengers, and 9,430 other people. **Mayhew D. "Reducing the Crash Risk for Young Drivers". June 2006**

For teenage drivers, the presence of one passenger almost doubles the fatal crash risk compared with driving alone. With two or more passengers, the fatal crash risk is five times as high as driving alone. On the other hand, for older drivers, passengers either have no effect on crash risk or a beneficial effect. **Doherty, et al., The Situational Risks of Young Drivers: The Influence of Passengers, Time of Day, and Day of Week on Accident Rates. *Accident Analysis and Prevention* 30:45-52.**

The increased risk with passengers present is thought to be largely the result of distractions and risk-taking factors. In police reports of fatal crashes in which tow or more teenagers were in the vehicle, there is in some cases evidence of distraction (e.g., turning around to talk to someone in the rear seat), physical interference (e.g., passenger grabbing the steering wheel), or inducements to risk taking (e.g., trying to get the driver to overtake another vehicle). **Williams, Preusser, Ferguson. 1998. Fatal crashes involving 16 year-old drivers: narrative descriptions. *Journal of Traffic Medicine* 26:11-17.**

California was the first state to enact a meaningful passenger restriction, not allowing passengers younger than 20 to be transported without an adult present for the first six months of licensure. Results showed that in 1999 teenage passenger deaths and injuries when traveling with 16-year-old drivers declined by 23 percent compared with the five prior years. **Automobile Club of Southern California, 2000**

A comparison between Oregon, a state with a strong intermediate GDL stage that includes nighttime and passenger restrictions, and Ontario, Canada, a province with a less restrictive intermediate stage, shows that per-driver crash rates among 16-year-old drivers are nearly 50% less in Oregon. **Mayhew D. "Reducing the Crash Risk for Young Drivers". June 2006**

COMMON MYTHS

Even though 44 states have a three stage GDL program, not one state has the four components advocated for by groups like the Insurance Institute for Highway Safety and the National Transportation Safety Board. These components include: Six month holding period provision for a learner's permit, at least 30 hours of supervised behind-the-wheel training with an adult licensed driver during the learner's permit stage, a nighttime restriction that limits unsupervised driving from the hours of 9 or 10pm to 5am during the intermediate stage of GDL, and a passenger restriction that limits the number of teenage passengers that may accompany a teen driver without adult supervision to one non-familial teenager. Despite the proven success of GDL programs, many still have concerns about the restrictions they impose. Below are some common myths regarding passenger restrictions.

Myth #1: Passenger restrictions place an undue impact on teenager's social activities.

Counterpoint #1: In a survey conducted of California teenage drivers regarding passenger restrictions, most (89 percent) said they could find ways to do their activities anyway, and 74 percent said the restriction did not affect them very much. The majority of parents said there was no inconvenience caused by the restriction. Only eight percent of parents said there was inconvenience that was frequent or major.

Myth #2: Enforcement of passenger restrictions is overly burdensome on law enforcement agencies.

Counterpoint #2: Passage of this legislation is not meant to be solely a directive for law enforcement to beef up efforts towards teen drivers. Successful implementations of GDL programs have always included parental involvement and broad education efforts (media, nonprofit groups, driving instructors, printed materials, etc.) For example, North Carolina made a recent adjustment to their GDL program (cell phone restriction), which yielded more than 200 news stories (print, radio, television), which in turn, reached the homes of millions of North Carolinians. The more parents and their teenagers know about their state's GDL laws, the more inclined they are to adhere to them.

Myth #3: Our state already has a GDL program that works just fine.

Counterpoint #3: Unfortunately, not one state in the nation has every component of an optimal GDL program. While many states over the years have implemented some form of GDL, the available and ongoing research validates the need for both nighttime and passenger restrictions, for which very few states have. A June 2006 study by Johns Hopkins University found that those states with comprehensive GDL programs that included nighttime and passenger restrictions showed up to a 20% decrease in fatalities amongst 16-year-old drivers.

ADDITIONAL RESOURCES

Baker, S., *National Evaluation of Graduated Driver Licensing Programs*, Johns Hopkins University, June 2006
http://tinyurl.com/gad6x

Mayhew, D., *Reducing the Crash Risk for Young Drivers,* AAA Foundation for Traffic Safety, June 2006
www.aaafoundation.org/pdf/ReducingTeenCrashes.pdf

National Safety Council, *Graduated Driver Licensing Symposium: The Collection of Papers*, 2003
www.nsc.org/gdlsym/index.htm